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how to build a collapsible plastic greenhouse

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how to build a collapsible plastic greenhouse

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This publication replaces No. 1337, How to Build a Plastic Crop Shelter or Greenhouse.

INTRODUCTION

A plastic greenhouse is well suited for raising a wide variety of vegetables, flowers, and transplants. The plants can be planted directly into ground beds or on raised benches, as in a conventional greenhouse. The structure described in this publication is inexpensive and easy to build, and is suitable for use as a temporary crop shelter or as a permanent greenhouse in all regions of Canada.

The greenhouse is 4.6 m wide by 2.25 m high and is made up of sections 1.5 m long, bolted to one another to make a structure of any desired length. Each section is made up of four 1.5 m x 1.65 m panels hinged together and made rigid by braces held in place by the same bolts that hold the sections together (see Figs. 10, 11, and 12).

The house is designed so that it can be

- made in any desired length
- quickly erected in any field
- moved from season to season for crop rotation
- easily dismantled and folded for storage in a 1.5 m x 3.3 m floor area.

MATERIALS

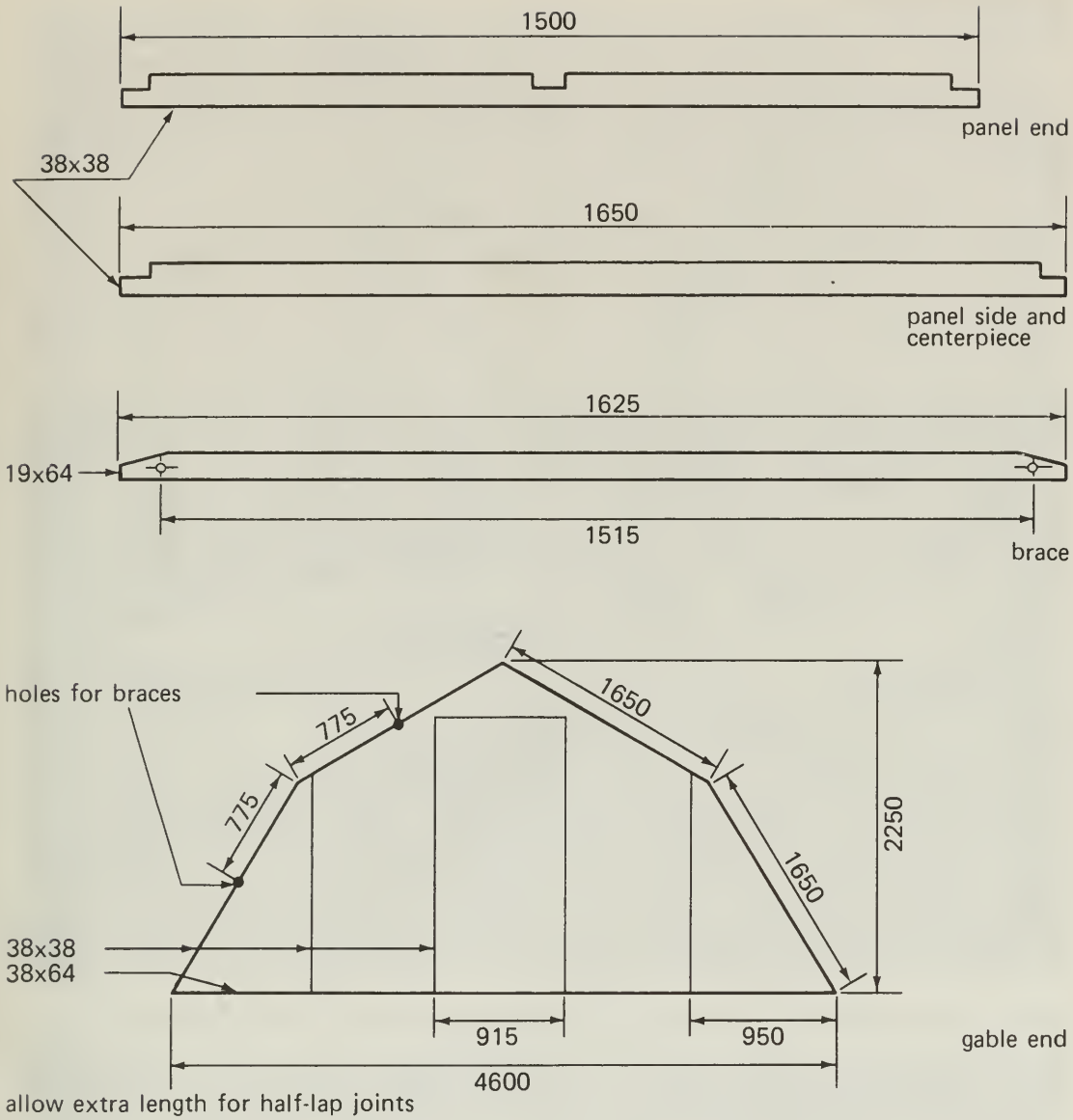
Any softwood lumber is satisfactory. Many types of plastic film are available, but they vary in durability and cost. A polyethylene plastic vapor barrier up to 100 μm is commonly used and inexpensive. However, it deteriorates slowly in the ultraviolet rays of bright sunlight and therefore may last for only one season. Other plastics, designed to withstand the effects of ultraviolet light and to resist extremes in temperature, may last up to 5 years but they are more costly. However, one of these may prove to be more economical than a number of replacements of the less expensive material.

CONSTRUCTION

Panels

Two cuts of lumber are needed for the panels (upper two in Figs. 1 and 2). Nail them together with 38-mm coated box nails to make a sturdy half-lap joint (Fig. 3). If desired, apply a wood preservative that is not toxic to plants. Then paint with weatherproof white or aluminum paint.

Hinge four panels together end to end, using nine 100-mm galvanized heavy strap hinges for each section (Figs. 4 and 5). Drill holes in the side pieces where the bolts are to go, using measurements given in Fig. 1.



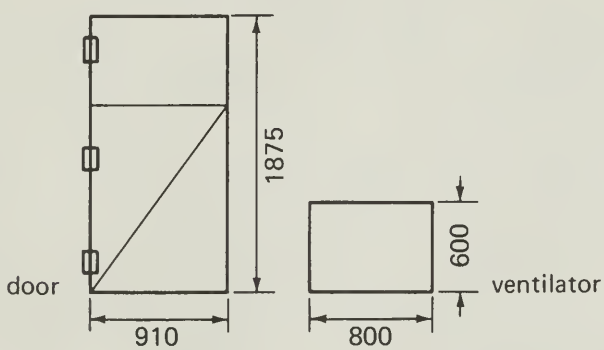


FIG. 1 Dimensions of materials for a plastic greenhouse. All dimensions are expressed in millimetres.

Gable ends

Construct the gable ends as detailed in Fig. 1. In the front gable install a door frame to receive a door 910 mm x 1875 mm. Make the door to fit this frame and cut a ventilator window 800 mm x 600 mm to fit into the door (Figs. 1 and 7).

Construct the opposite gable end the same as the front but fit it with the ventilator only (Fig. 8).

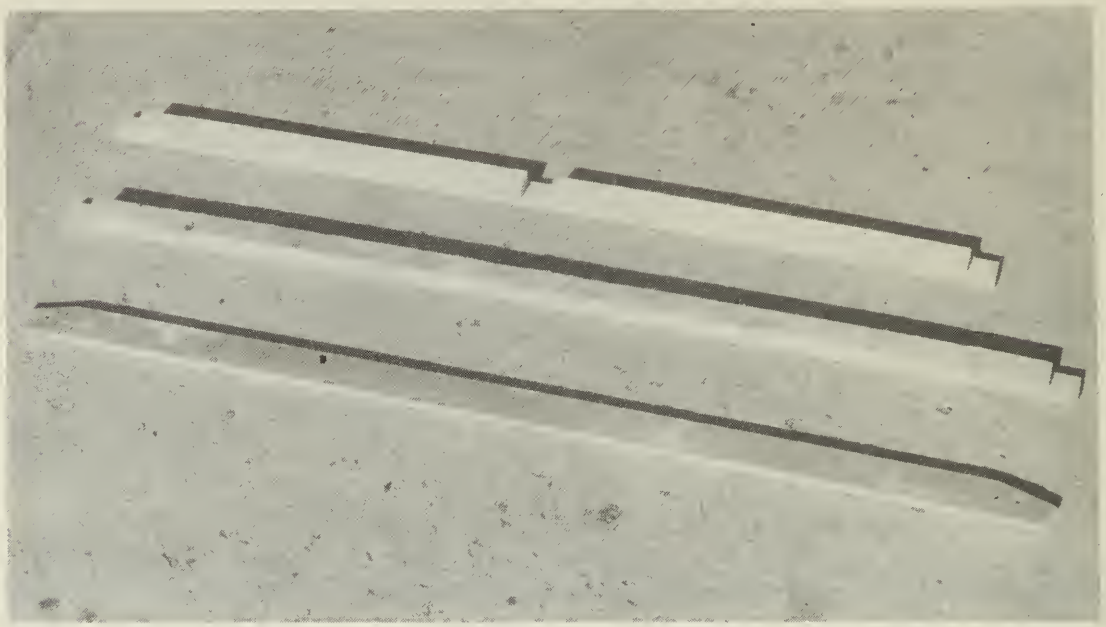


FIG. 2 The basic cuts of lumber used to make up the panels. (Dimensions in Fig. 1.)

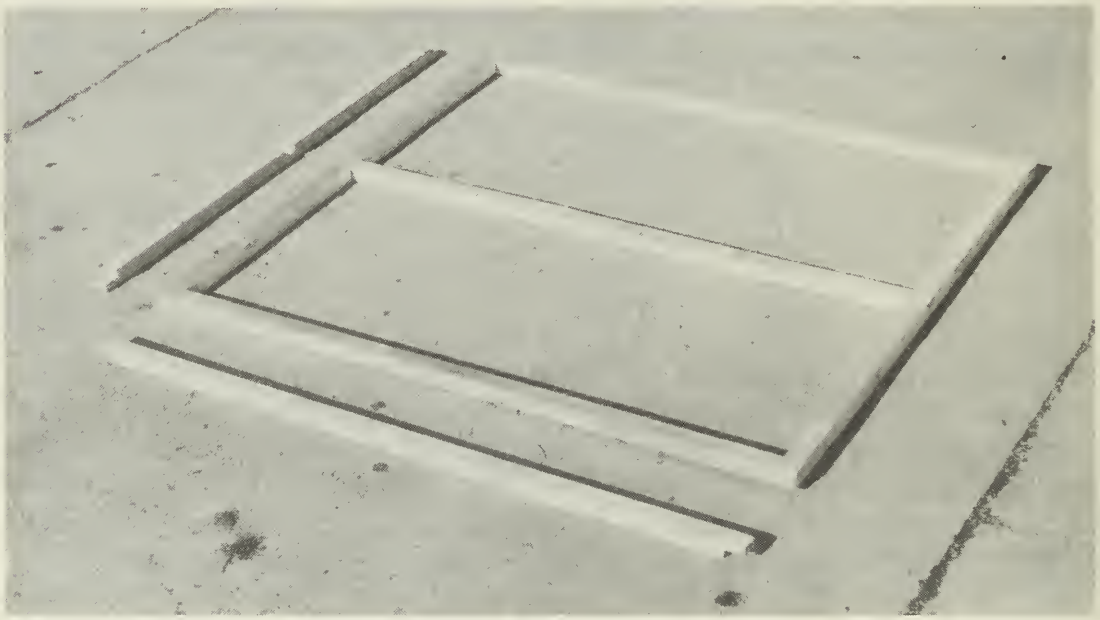


FIG. 3 Pieces of wood 38 mm x 38 mm in position, and an assembled panel.

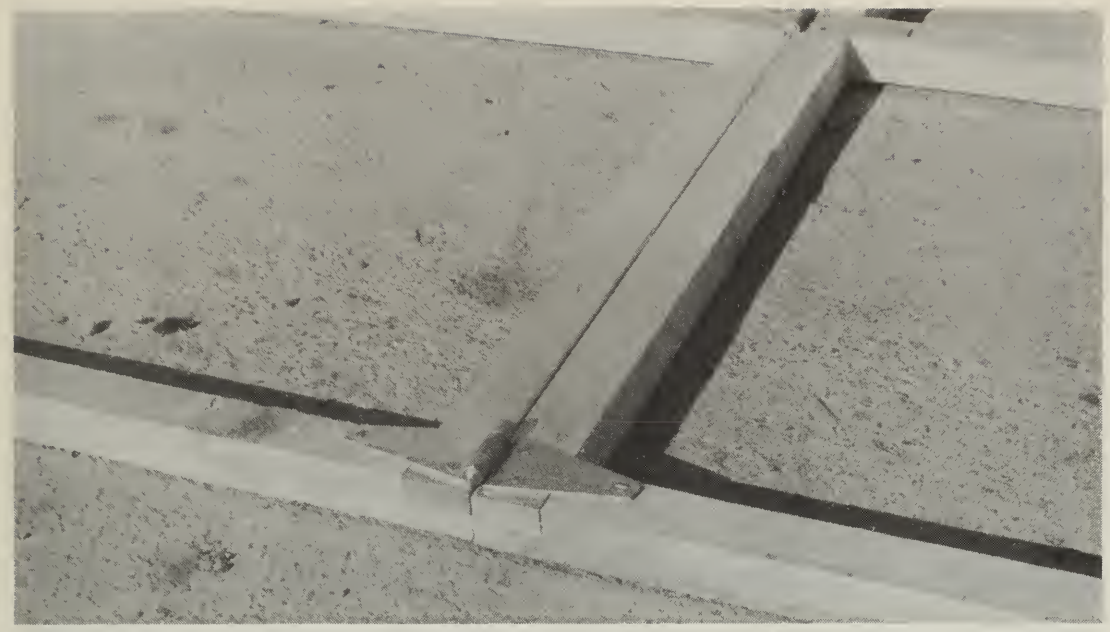


FIG. 4 Panels joined by heavy strap hinges.

To achieve the correct angles on the gable framework, lay one of the hinged four-panel sections on its side, attach braces, and set bases 4.6 m apart. Then lay out the gable end to match this.

Cut 19 mm x 64 mm braces, illustrated at the bottom of Fig. 2, according to the measurements in Fig. 1.

Securing the plastic

Fold one section of four panels in half and place it on a workbench (Fig. 6). By using blocks 400 mm long for support, raise the hinged joint between the two panels of the half section. This will provide the required slack in the plastic for the angle that will be made when the section is in its final position. Cover the half section with plastic 1800 mm wide, leaving a 150-mm overlap at the bottom (the end that will be on the ground when the structure is erected) and on both sides. Staple at the bottom end to hold the plastic in place, and then nail on a 10 mm x 19 mm painted strip. Staple the plastic along the sides and nail the painted strips over the staples and along the center of each panel. If there is a centerfold in the plastic, be sure to cover it with the center strip, because this fold will deteriorate quickly if it is not covered. Nail the strips every 150 mm to 300 mm with 38-mm coated box nails.

Turn the section over. Continue the plastic over the ridge and cover the other two panels with the center raised as before. Now cut the plastic, leaving a 150-mm overlap at the end, the same amount as was left at the start of that section. Staple the plastic and then nail the strips on the end, at the ridge, and on the sides and centers of each panel.

Cover the gable ends, ventilators, and door separately, first using staples and then the painted strips as in the construction of the panels.

Plastic film should be applied when the temperature is moderate. If the temperature is too low when the plastic is put on, the plastic will expand and become too slack during hot weather. If the temperature is too high, the plastic will contract when the weather turns cold and it may tear.

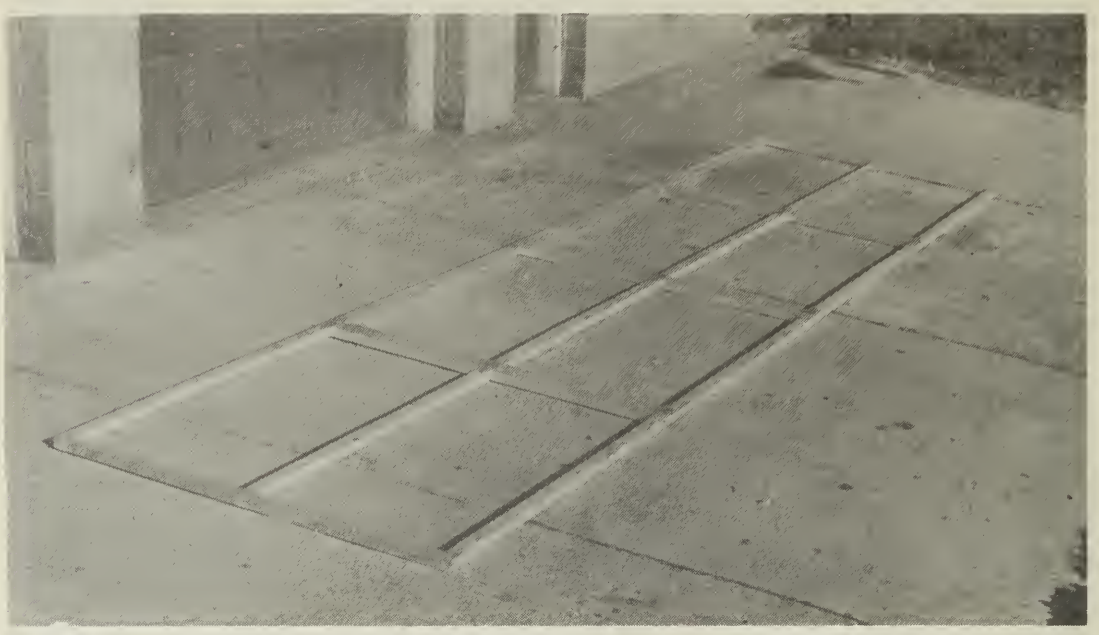


FIG. 5 Four panels joined end to end to make one section.

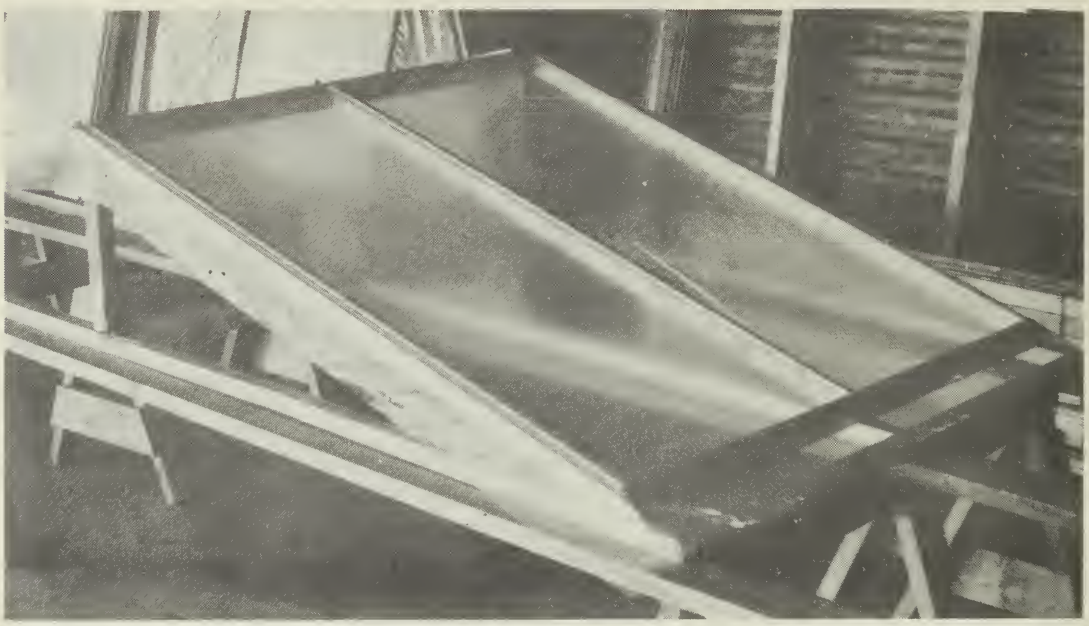


FIG. 6 A section covered with plastic.

FIG. 7 Front gable end, door, and ventilator window.

FIG. 8 Back gable end, which will be fitted with top-hinged ventilator window.

Erecting the greenhouse

Open out one section and bolt it to one of the gable ends using four 125 mm x 6 mm galvanized bolts with wing nuts and galvanized washers. With the same bolts fasten a single brace on each inside corner against the gable end. Bolt on each section in turn (using 150 mm x 6 mm galvanized bolts, with wing nuts and washers) and

attach a brace on each side of the joint (Figs. 9, 10, 11, and 12). Bolt on the other gable end in a similar fashion.

Before bolting any two sections together, fold down the two 150-mm overlapping edges of plastic, fold them together, and staple them against the inside edge of one panel. The joints between sections will then be airtight.

Smooth the soil surface under the base. Dig a shallow depression adjacent to the outside base of the structure. Place the 150-mm overlap of the plastic into the depression and cover it with soil. Drive 38 mm x 38 mm anchor pegs (see title page) inside and outside where the sections join, midway on the back gable end, and on each side of the door. To prevent damage during high winds, nail the sections to the anchor pegs.

Attach ventilators and door with 75-mm galvanized heavy butt hinges. Hinge the ventilator at the top (Fig. 7) to open to the outside. Use storm-sash adjusters on each side of the ventilator to hold it securely at any position. Install turn buttons and a pull handle on the outside so that the ventilator can be opened or closed from the outside.

A gate latch may be used on the door. Drive a peg into the ground to stop the door from opening more than 90 degrees. This will prevent the open ventilator on the door from hitting the side of the house when the door is opened. Pointed metal rods 12 mm in diameter and bent over at the tops may be pushed into the ground to hold the door open at any position if more ventilation is needed on hot days.

FIG. 9 A completed section ready to be added.

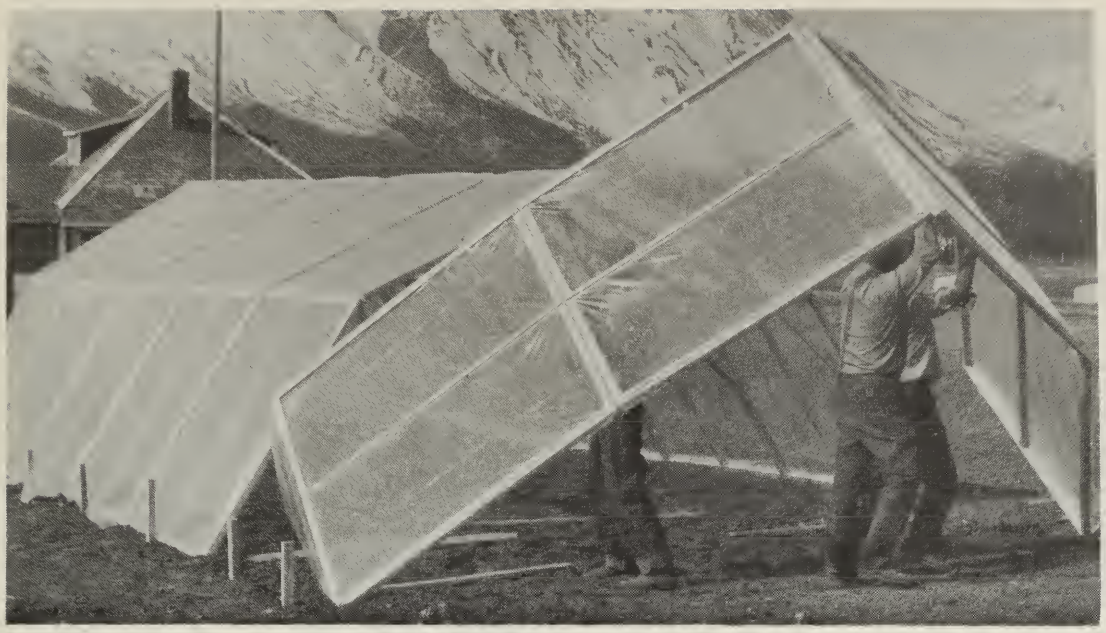


FIG. 10 Another section being lifted into place.

FIG. 11 A section being bolted to an adjacent section. Note position of braces.

HEATING

Small gas, oil, electric, or wood-burning heaters may be used in the greenhouse. If the house is long, a circulating fan connected to the heater may be necessary. Plastic heat ducts from the fan can be made by folding 900-mm plastic sheeting and stapling the edges together to form a tube. Cut air outlets along the length of this tube as required. Large drums painted black and filled with water provide a simple system of heat storage to absorb excess heat on sunny

FIG. 12 Interior view of a completed plastic greenhouse.

days; otherwise this heat might have to be vented to prevent overheating. The heat will be released at night and will reduce heating costs. However, the barrels occupy valuable growing space that you might prefer to use for plants.

VENTILATING

Greenhouses longer than 9 m may need forced-air ventilation during hot days, because the ventilators and door may not provide sufficient air exchange. Ventilating fans controlled by a thermostat are a useful accessory, even in smaller greenhouses.

DOUBLE LAYERING

A second layer of plastic, usually of a lighter material, fastened to the inside of the greenhouse can reduce heating costs by as much as 40%. The dead-air space between the layers acts as an insulator. If you plan to use double plastic, erect the house first, with only the outer layer of plastic over it. Then staple the inner layer to the panel frames and the braces. Lath or wood strips are not required inside the house.

MATERIALS REQUIRED

Note: All dimensions are expressed in millimetres.

Each 1.5-m section:

10 pieces	38 x 38 x 3600
2 pieces	19 x 64 x 3600
10 pieces	10 x 19 x 3600
plastic film	7200 x 1800
4½ pairs	100-mm galvanized heavy strap hinges with screws
4	150 x 6 galvanized bolts with wing nuts and washers
450 g	38-mm coated box nails
wood preservative and paint	

Gable ends:

12 pieces	38 x 38 x 3600
2 pieces	38 x 64 x 4800
12 pieces	10 x 19 x 3600
2 pieces	19 x 64 x 3600
plastic film	12 000 x 1800
3½ pairs	75-mm galvanized heavy butt hinges with screws
1	gate or barn door-latch
8	125 x 6 galvanized bolts with wing nuts and washers
450 g	38-mm coated box nails
4	(2 sets) storm-sash adjusters complete with pull handle
2	turn buttons
wood preservative and paint	

ALTERNATIVE DESIGNS

Many small greenhouses are commercially available. Some have metal frames but their function is the same as that of the wooden-frame design described in this publication. Because costs of materials and labor vary from area to area, it is advisable to compare cost and benefits of the different designs.

Additional information is available in *Plastic greenhouses*, Publication 40, Information Branch, Ontario Ministry of Agriculture and Food, Legislative Building, Toronto, Ont. M7A 1A5.

CONVERSION FACTORS

Metric units	Approximate conversion factors	Results in:
LINEAR		
millimetre (mm)	x 0.04	inch
centimetre (cm)	x 0.39	inch
metre (m)	x 3.28	feet
kilometre (km)	x 0.62	mile
AREA		
square centimetre (cm^2)	x 0.15	square inch
square metre (m^2)	x 1.2	square yard
square kilometre (km^2)	x 0.39	square mile
hectare (ha)	x 2.5	acres
VOLUME		
cubic centimetre (cm^3)	x 0.06	cubic inch
cubic metre (m^3)	x 35.31	cubic feet
	x 1.31	cubic yard
CAPACITY		
litre (L)	x 0.035	cubic feet
hectolitre (hL)	x 22	gallons
	x 2,5	bushels
WEIGHT		
gram (g)	x 0.04	oz avdp
kilogram (kg)	x 2.2	lb avdp
tonne (t)	x 1.1	short ton
AGRICULTURAL		
litres per hectare (L/ha)	x 0.089	gallons per acre
	x 0.357	quarts per acre
	x 0.71	pints per acre
millilitres per hectare (mL/ha)	x 0.014	fl. oz per acre
tonnes per hectare (t/ha)	x 0.45	tons per acre
kilograms per hectare (kg/ha)	x 0.89	lb per acre
grams per hectare (g/ha)	x 0.014	oz avdp per acre
plants per hectare (plants/ha)	x 0.405	plants per acre

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